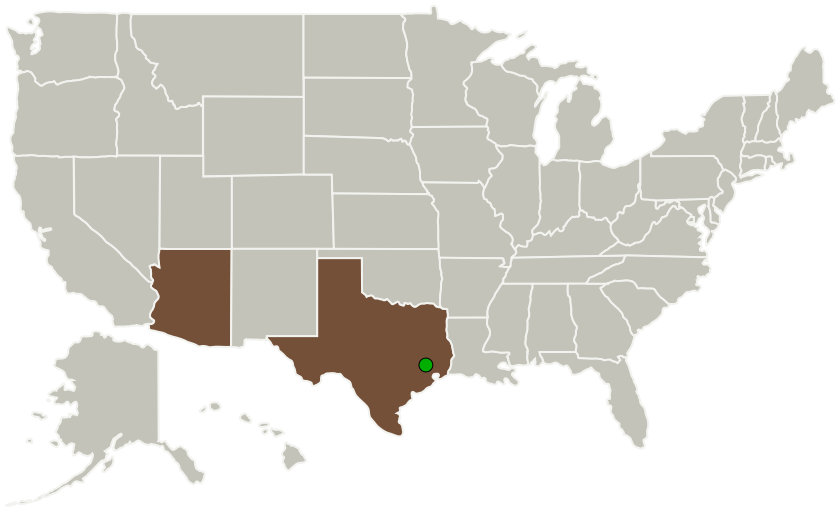
AggieSat: Autonomous Rendezvous and Docking Technology Demonstrator, Phase II

Completed Technology Project (2010 - 2012)

Project Introduction

Current autonomous rendezvous and docking (AR&D) capability in low Earth orbit (LEO) is constrained by sensor and effector mass, power, and accuracy limits. To this end, NASA Johnson Space Center has developed a GPS receiver, called DRAGON (Dual RF Astrodynamic GPS Orbital Navigator), specifically to address the sensor constraints. The proposed innovation includes creating a small, low-cost, and versatile technology demonstrator to validate and increase the technology readiness level of DRAGON and other state-of-the-art miniaturized sensors and effectors in an on-orbit AR&D operational scenario. For Phase 1, a demonstration platform was developed that utilizes two picosatellites in LEO, and relative GPS as the primary sensor. These satellites were launched as a single unit from the SSPL (Space Shuttle Payload Launcher) on STS 127, to separate and transmit DRAGON data. The picosatellite technology demonstrator was at a TRL of 7 at the end of Phase 1. For Phase 2, NASA plans a second flight, and the technical objectives are to further characterize the DRAGON receiver and develop navigational solutions using DRAGON data. Additional technologies addressed include the development of a simple low-cost, low-mass three-axis stabilization and pointing system for small satellites, WiMax transceiver capabilities, and video camera capabilities. The technologies should be at a TRL of 6 at the end of Phase 2.

Primary U.S. Work Locations and Key Partners



AggieSat: Autonomous Rendezvous and Docking Technology Demonstrator, Phase II

Table of Contents

AggieSat: Autonomous Rendezvous and Docking Technology Demonstrator, Phase II

Completed Technology Project (2010 - 2012)

Organizations Performing Work	Role	Type	Location
Physics, Materials, and Applied Mathematics Research, LLC	Lead Organization	Industry	Tucson, Arizona
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas
Texas A&M Engineering Experiment Station(TEES)	Supporting Organization	Academia	College Station, Texas

Primary U.S. Work Locations	
Arizona	Texas

Project Transitions

September 2010: Project Start

September 2012: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138811)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Physics, Materials, and Applied Mathematics Research, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

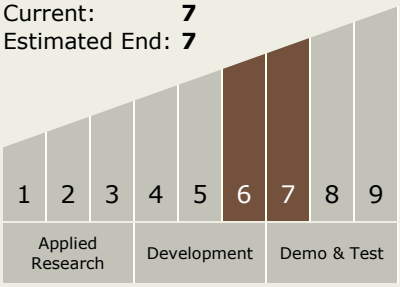
Carlos Torrez

Principal Investigator:

Helen L Reed

Technology Maturity (TRL)

Start: **6**
Current: **7**
Estimated End: **7**



AggieSat: Autonomous Rendezvous and Docking Technology Demonstrator, Phase II

Completed Technology Project (2010 - 2012)

Technology Areas

Primary:

- TX04 Robotic Systems
  - TX04.5 Autonomous Rendezvous and Docking
    - TX04.5.2 Rendezvous & Docking Algorithms

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System